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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/760,524

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Wei-Hong Wang

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EXAMINER

LIN, JAMES

ART UNIT

PAPER NUMBER

1792

NOTIFICATION DATE

DELIVERY MODE

10/30/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/760,524	Applicant(s) WANG, WEI-HONG	
	Examiner Jimmy Lin	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-17 and 26-33 is/are pending in the application.
- 4a) Of the above claim(s) 2, 4-7, 10-13 and 15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 8, 9 and 26-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/13/2007 has been entered.

Election/Restrictions

2. Because claim 31 has been amended such that it no longer belongs a withdrawn species, the claim has been considered.

Claim Objections

3. Claim 30 is objected to because of the following informalities: $H_yTiO_{[(4-y)/2+y]}/H_xTiO_{[(3-x)/2+x]}$ -SCA should be amended to $H_yTiO_{[(4-y)/2+y]}/H_xTiO_{[(3-x)/2+x]}$ -SCA. The "/" between the $[(4-y)/2+y]$ and H_x should not be in the subscript.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 8-9, 30-31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu (U.S. Patent No. 6,242,862) in view of Nakabayashi (EP 1,136,125) and Willner et al. (U.S. Patent No. 6,365,007). Toki et al. (U.S. Publication No. 2004/0197254) and Fujimoto et al. (U.S. Publication No. 2003/0013930) are cited as evidence of inherency.

Kawakatsu discloses a method of fabricating a photocatalytic fluorescent lamp (Fig. 12) comprising:

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combining titanium alkoxide with acetylacetone (i.e., a strong chelating agent (SCA), see [0030] of Toki as evidence of inherency) in aqueous solution (col. 15, lines 7-15) to form TiO₂-SCA gel;

forming semiconductor nano-anatase TiO₂ sol (column 9, lines 35-37);

dip coating the nano-crystalline anatase sol (column 15, lines 15-16) on a surface of a fluorescent lamp tube (Fig. 12);

baking said fluorescent lamp tube coated with nano-crystalline anatase sol to form a photocatalytic coating fluorescent lamp (column 4, line 23) capable of cleaning air (column 1, lines 17-18);

wherein the baking step is carried out at a temperature above 200 °C (column 4, line 23).

The claims require a baking step at a temperature of *about* 100-200 °C. The temperature range is interpreted to be from about 100 °C to about 200 °C. In this case, about 200 °C includes temperatures close to but not exactly 200 °C, such as temperatures slightly higher. Thus, about 200 °C would at least have an overlapping range with above 200 °C. Additionally, assuming *arguendo* that the claim requires an upper limit of exactly 200 °C, one of ordinary skill in the art would have expected that the temperatures of 200 °C and 200.1 °C (i.e., above 200 °C) are so close that either temperature would have yielded similar results and would have resulted in a photocatalytic lamp having similar properties when using either temperature. A *prima facie* case of obviousness exists where the claimed ranges and prior art do not overlap but are close enough that one in ordinary skill in the art would have expected them to have the same properties.

Titanium Metals Corp. of America v. Banner, 778 f.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time of invention to have used 200 °C, as opposed to a temperature slightly above 200 °C, with a reasonable expectation of success and an expectation of similar results. Moreover, the upper limit of 200 °C is not explicitly taught in the specification and, thus, has no criticality in the process. Such a change of the upper limit seems to be an attempt to overcome the applied prior art but would not be a patentable difference because the Applicant has not shown that such a temperature would have unexpected results. Because the claim has been amended from an upper limit of 250 °C to 200 °C without any support of criticality, the Applicant has shown that an upper limit of 200 °C would have been an obvious modification.

Kawakatsu does not explicitly teach that a Eu or rare earth metal salt is combined with the chelating agent and aqueous solution. Kawakatsu does teach a method of making a photocatalytic film comprising of a titanium dioxide sol.

Willner teaches that the incorporation of lanthanide ions such as europium ions in a titanium dioxide matrix, e.g., by means of a sol-gel method enhances the photocatalytic activity of the titanium dioxide (col. 2, lines 1-47). The europium can be incorporated into the sol-gel with the addition of europium acetate (i.e., a europium salt, see [0018] of Fujimoto as evidence) (col. 5, lines 8-17). Because Willner teaches advantages for doping titanium dioxide being used as a photocatalyst, it would have been obvious to one of ordinary skill in the art at the time of invention to have doped the titanium oxide of Kawakatsu with europium by the addition of europium acetate into the sol-gel with a reasonable expectation of success. One would have been motivated to do so in order to have enhanced the photocatalytic activity.

Kawakatsu does not explicitly teach the step of peptizing the TiO_2 gel by adjusting the pH and forming crystalline TiO_2 particles via a hydrothermal process. However, Nakabayashi teaches a method of making a photocatalyst comprising of titanium oxide sol. The method of making the titanium oxide sol includes a peptizing process with ammonia and a hydrothermal treatment thereafter [0039]. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have included a peptizing process and a hydrothermal treatment in the method of making the titanium oxide sol of Kawakatsu with a reasonable expectation of success because Nakabayashi teaches that such processes are suitable in the method of making titanium oxide sol.

Considering that the materials used in forming the nano-crystalline anatase sol and the baking temperature are substantially the same as those disclosed and claimed by applicant, the brightness of the photocatalytic coating fluorescent lamp would inherently increase, unless some critical steps are missing from the claims. In addition, a small amount of UVA and blue light from the fluorescent lamp would inherently be absorbed by the anatase coating.

Claims 3,31: Nakabayashi teaches that the peptizing process can be carried out using ammonia [0039].

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Claim 8: Kawakatsu teaches that a normal fluorescent lamp can be used (Fig. 12).

Claim 9: The fluorescent lamp is a straight tube (Fig. 12).

Claim 30: Kawakatsu teaches a TiO_2 -SCA gel having the formula $\text{H}_y\text{TiO}_{[(4-y)/2+y]}$, wherein y equals 0.

6. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Rengakuji et al. (U.S. Patent No. 6,602,607).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach a titanium alkoxide, wherein the R of $\text{Ti}(\text{OR})_4$ is a hydrocarbon group, $\text{C}_n\text{H}_{2n+1}$, where $n=1-5$. However, Rengakuji teaches that such titanium alkoxides are well known for their use to make titanium dioxide as a photocatalyst (abstract; col. 3, lines 31-35). The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used one of the titanium alkoxides as taught by Rengakuji as the particular titanium alkoxide of Kawakatsu with a reasonable expectation of success because Rengakuji teaches that such alkoxides are suitable for use as a photocatalyst.

7. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Mori et al. (U.S. Patent No. 6,420,437).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the chelating agents can be acetonacetate, amino acid, succinic acid, or an organic alcohol $[\text{RC}_6\text{H}_3(\text{OCH}_3\text{OH})]$. However, Mori teaches the use of succinic acid as a chelating agent in the method of making titanium oxide sol. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used succinic acid as the particular chelating agent of Kawakatsu with a reasonable expectation of

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success because Mori teaches that such a chelating agent is suitable in the art of making titanium oxide sol.

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Boykin et al. (U.S. Publication No. 2004/0112411).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the chelating agents can be acetonacetate, amino acid, succinic acid, or an organic alcohol [RC₆H₃(OCH₃OH)]. However, Boykin teaches that amino acids are well-known chelating agents. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used succinic acid as the particular chelating agent of Kawakatsu with a reasonable expectation of success because Mori teaches that amino acids are suitable chelating agents.

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Baiker et al. (U.S. Patent No. 5,935,895).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the molar ratio of the chelating agent and the titanium alkoxide has a molar ratio of 0.01-1.0. However, Baiker teaches that titanium alkoxide and the chelating agent can have a molar ratio between about 1:2 and about 3:1. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used the a ratio between 1:2 and 3:1 of the titanium alkoxide to the chelating agent with a reasonable expectation of success because Baiker teaches that such molar ratios are suitable for such a mixture. In addition, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical (MPEP 2144.05.II.A.). Therefore, it would have been obvious to one of ordinary skill in the art at the

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time of invention to have looked to the prior art for a conventional or known molar ratio for the mixture of chelating agent and titanium alkoxide.

10. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Tabatabaie-Raissi et al. (U.S. Patent No. 6,309,611).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that the titanium alkoxide is combined with chelating agents and a water-based aqueous solution. However, Tabatabaie-Raissi teaches the combination of titanium alkoxide, ethanol, and acetylacetone (i.e., a chelating agent) with water in the method of making a photocatalytic device (col. 9, lines 57-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have added water to the titanium alkoxide/acetylacetone solution of Kawakatsu with a reasonable expectation of success because Tabatabaie-Raissi teaches that such an aqueous solution is suitable in making a photocatalytic device.

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakatsu '862 in view of Nakabayashi '125 and Willner '007 as applied to claim 1 above, and further in view of Nakamura et al. (U.S. Patent No. 5,759,251).

Kawakatsu, Nakabayashi, and Willner are discussed above, but do not explicitly teach that H_4TiO_4 solution to a H_4TiO_4/TiO_2 ratio of about 0-10 wt%. However, Nakamura teaches a method of making a photocatalytic and transparent TiO_2 coating (abstract), wherein the coating can be prepared by adding an orthotitanic acid (i.e., H_4TiO_4) solution to a titanium dioxide solution (col. 13, lines 1-21). The orthotitanic acid can have a ratio between 0-0.5 wt% (Table 1). Because Nakamura teaches that such is operable in the art of photocatalytic titanium dioxide, it would have been obvious to one of ordinary skill in the art at the time of invention to have added orthotitanic acid solution to the TiO_2 solution of Nakabayashi at a H_4TiO_4/TiO_2 ratio of about 0-0.5 wt% with a reasonable expectation of success. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

12. Applicant's arguments filed 6/13/2007 have been fully considered but they are not persuasive.

Claims 1, 3, 8-9, 30, and 32-33 as rejected over Kawakatsu '862:

Applicant argues on pg. 17 that Kawakatsu does not disclose or suggest the low temperature baking step of 100-200 °C as recited in the present claims. However, Kawakatsu does explicitly teach that the baking step can be carried out at temperatures above 200 °C. The claims require a baking step at a temperature of *about* 100-200 °C. The temperature range is interpreted to be from about 100 °C to about 200 °C. In this case, about 200 °C includes temperatures close to but not exactly 200 °C, such as temperatures slightly higher. Thus, about 200 °C would at least have an overlapping range with above 200 °C, such as a temperature of 200.1 °C.

Applicant argues on pg. 17 that Kawakatsu does not disclose combining the titanium alkoxide with the chelating agents: Eu or a rare earth metal salt, and an aqueous solution to form a TiO₂-SCA gel. However, the claims are not limited to the Eu or rare earth metal salt being the chelating agent. Presently, only the addition of such a salt is required. The teaching of Willner has been incorporated into the rejection to account for the claim amendment.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wiederhofs et al. (5,840,111) discloses a process for making nanodisperse titanium dioxide.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is 571-272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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